totals or frequencies, while the great Spring offensive of 1917 failed to interrupt the long spell of brilliant weather which accompanied it.

An examination was made some months ago at the British Meteorological Office into the local distribution of rainfall over England during the first 22 months of the war, the results of which afford corroborative evidence for M. Angot's last-mentioned point. It was found that the greatest excess of rain over the normal figure was one of 59 per cent on the south Yorkshire coast; that three areas in Lincolnshire and on the Norfolk and Suffolk coasts, respectively, had rather more than 40 per cent excess; but that round the North Foreland there was a slight deficit. No trace whatever of a distribution having reference to a center over northern France was discoverable.

M. Angot concludes with the reflection that it may be with rainfall and gunfire as it is with weather changes and the phases of the moon, that—

sous la suggestion d'une croyance instinctive on est conduit involontairement à ne remarquer que les coïncidences favorables et à s'affermir ainsi de plus en plus dans cette croyance.

[under the suggestion of an instinctive belief, one is involuntarily led to note only the favorable coincidences and thus become more and more confirmed in the belief.]

For those, indeed, who are cognizant of the relationship between the weather and modern warfare it is not difficult to see the possibility of the connection, but it is a connection in which the amount of gun fire varies inversely as the amount of rain that is falling rather than one which makes the rainfall in any way dependent on the gunfire.—*E. L. Hawke.*

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BIRD MIGRATION IN CENTRAL SWITZERLAND IN RELATION TO METEOROLOGICAL CONDITIONS.[1]

By Dr. K. BRETSCHER.

[*Reprinted from* Nature, London, Sept. 20, 1917, 100:47—48.]

The relation of bird migration to meteorological conditions has been considered, of late years, an important part of the study of the movements of birds, and various theories have been advanced to explain their interrelations. In the memoir before us Dr. Bretscher deals very fully with the arrival in Spring and departure in Autumn of the summer visitors to central Switzerland. In relation to these he treats of bird migration and atmospheric pressure, wind, atmospheric precipitation, temperature, etc., and under each heading he has tables of statistics in support of the statements in the text. By Tables 1 and 15 he shows that the position of barometric depressions within the area has, as we should expect, no influence on the arrival of the summer migrants and their departure in autumn. In Tables 3 and 4 he discusses the influence of direction and strength of the wind, and concludes that, in central Switzerland, migration proceeds irrespective of the direction of the wind and that, unless the force be so great as to be a hindrance, the influence of this, too, may be regarded as a negligible quantity. The fourth section deals with atmospheric precipitation in relation to bird migration; as the author tells us in Switzerland even keen ornithologists stay at home in wet weather, we are not surprised to find that they have few direct records of migration in rain, snow, or fog, and he himself says, further observations on th subject are wanted.

What strikes one as being the most interesting of any of the sections are those on spring and autumn migration in relation to temperature. Dr. Bretscher gives many interesting tables showing the number of observations on the movements of each species under each degree of temperature centigrade. These indicate the maximum and minimum between which migration takes place, the gradual increase to the most favorable migration temperature, and the decrease after this is reached. Here we see that birds migrate between certain temperatures, which vary according to the species; thus, the blackbird and song thrush perform their migrations at a lower temperature than the insect-eating warblers. Another aspect is presented in Table 9—namely, the duration of the migration period in relation to the average temperature—and the author here comes to the conclusion that the two are not correlated; thus the warmest average temperature does not necessarily coincide with the shortest migration period, nor does a cold spell mean a lengthening of the time over which the migration extends. Table 10 shows the difference of temperature of the migration day and that directly preceding it, and purports to prove that it is the temperature of the moment, not that which went before, which incites birds to migrate. It seems, however, as if the author had somewhat confused the issue; it can not be the temperature at the point of arrival which incites the birds to begin its migration in Spring. After this we have the various migration dates compared for Switzerland, Hungary, Bavaria, and Württemberg, though as the last has only three entries we think it might have been omitted.

In conclusion, the author indicates his conviction, which is probably shared by most ornithologists, that the real incentive to migration is not to be found in outward circumstances, but must be sought in physiological conditions. The outward conditions, including food, do undoubtedly have some effect on it, but do not produce the necessary impulse. Though there is perhaps nothing startlingly new in this pamphlet, yet it is a welcome addition to the literature relating to migration; it shows much careful work, and the fact that Dr. Bretscher refrains from drawing more than very tentative conclusions adds to, rather than detracts from, its value. He realizes that it is not possible to come to any definite solution of the problem he is studying without observations—and we would add, meteorological data—made over a much wider field.—*W. E. C.*

Weather Bureau men may recall an interesting illustrated article on bird migrations across North and South America, published in the National Geographic Magazine, April, 1911, by W. W. Cooke. One of Mr. Cooke's maps of dates of arrival in the United States is very strongly suggestive of a map of isotherms for the region. In a note accompanying a report of the effect of a severe storm in 1899 on bird movements, Professor Abbe [2] also pointed out that bird movements were chiefly controlled by food supply; but food supply is controlled by the weather and the climate and no doubt some of our experts in correlation investigations will be able to show a close correlation between bird movements and some one of our weather factors. Perhaps such a study has already been made.—C. A., jr.

[1] "Der Vogelzug im schweizerischen Mittelland in seinem Zusammenhang mit den Witterungsverhältnissen." Von Dr. K. Bretscher. Nouveaux mémoires de la Société Helvétique des Sciences naturelles, vol. 51, mem. 2.

[2] *See* MONTHLY WEATHER REVIEW, February, 1899, 27:60.